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HOW DO TECHNICAL AND NON-TECHNICAL PERSONNEL COMMUNICATE?

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In an industrialized nation which depends on highly technical information, communication occurs across various strata among experts and among experts and lay persons. Many persons with both technical and non-technical backgrounds spend much of their time writing in technical fields. One of my first experiences as a writer (with a non-technical background) occurred in the marketing department of Texas Instruments. I often had to discuss a project with an engineer in order to write about it. I often found communications between us difficult. This experience has led me to ask several questions. How do technical writers view the writing process? Do persons with technical backgrounds view the writing process differently from those with non-technical backgrounds? How do technical and non-technical personnel communicate with each other? Could I discover an interview model which would facilitate communications between technical and non-technical personnel?

To investigate the writing process I interviewed 15 persons who spend much of their time writing in technical fields. Of the 15 interviewed six have degrees in technical fields such as organic chemistry, medicine, and engineering. The other nine had non-technical degrees in such areas as education, journalism, English, and other liberal arts degrees. I asked those surveyed questions about the writing process, with special emphasis on the pre-writing phase. I wanted to find out what they perceived as their main concerns and their main problems. I also listened to three interviews between writers with non-technical backgrounds and engineers. From these sessions I drew conclusions about the types of information which a writer is often trying to obtain from consultations with technical experts, which allowed me to draw a model of questioning procedures.

The writing performed by persons interviewed falls into two categories. In one category the purpose is instructional or informational, including technical procedures for installation or use of equipment, diagnostic procedures, and product descriptions. In the other category the purpose is motivational, implying that some action is to be taken by the audience. This category includes financial and sales reports, administrative reports, and brochures. As the table below illustrates, the writers with technical degrees write instructional-informational material while those with non-technical degrees are divided between both categories. Personnel interviewed write in either one category or another;

Table 1 Writing Categories of Personnel Interviewed

Type of degree	Informational	Motivational
Technical	6	0
Non-technical	4	5

there is no cross-over. Of the 15 whom I interviewed, it seems that those with

non-technical degrees may be able to find writing jobs in more diverse fields. Those with technical degrees seem to be placed more often in jobs which require writing in the areas of procedures or product descriptions.

My first question was whether technical writers use written resources or interviews with experts most often in gathering and understanding material to be written about. Written resources include manuals, drawings, encyclopedias, and articles. Experts are defined as those who have technical degrees in the areas in which they work. The table below illustrates that both technical and non-technical personnel involved in writing rely on written material more than interviews with experts.

Table 2 Resources Used Most Often in Pre-Writing by Personnel Interviewed

Type of degree	Interviews with Experts	Written Material	Both Used Equally
Technical	0	4	2
Non-technical	2	4	3

None of the writers with technical backgrounds could say that they use interviews with other experts most often in their writing, although two said that they use experts and written materials equally. One scientist revealed that it was often difficult to get scientists to consult with each other because of the fear that their ideas would be used by someone else. A highly specialized medical doctor involved in heart implant research said that although he did consult with others in his field, it was difficult to communicate with persons whose expertise differed very much from his own. One engineer confided that he had difficulty in following the "buzz words" of engineers in a different field. Even those with technical backgrounds have difficulty communicating with other experts, even if they are in related fields.

Of the non-technical people, the two who depend most on interviews with experts write in highly specialized fields. One writes computer program manuals; the other writes instruction manuals for the use and installation of oil-field equipment. These persons are dependent on the experts for explaining the procedures and for editing for accuracy. Both write for audiences who do not have the expertise of the persons who designed the programs or equipment. These two technical writers feel that it is an advantage not to have a degree in a technical field. Because they are lay persons, they feel that they can identify with their lay audiences and anticipate answering any questions which the audiences might have.

Both the technical and non-technical personnel mentioned the same difficulties in consulting with experts. Arranging time for an interview seems to be a major problem. One writer said that she often had to resort to showing engineers that meeting with her was to their advantage, since manuals had to be ready before the products which the engineers had designed could be shipped. She also appealed to their empathy by informing them of her deadlines.

Writers had the following difficulties in discussing projects with experts:

understanding experts' vocabulary
understanding methods and procedures explained by experts
establishing mutual respect
writers realizing their lack of knowledge in an area

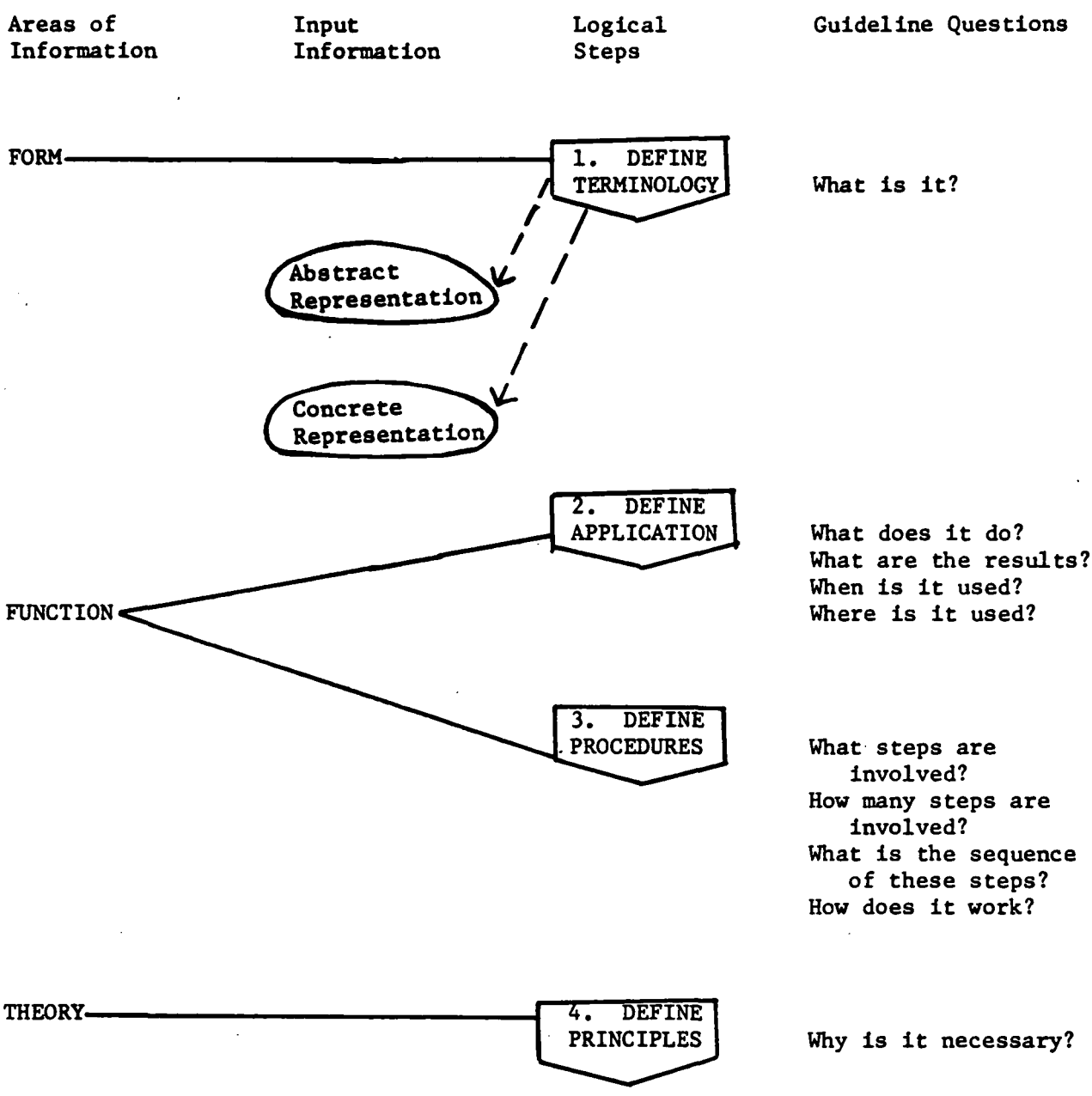
In learning vocabulary, methods, and procedures, writers consult manuals, drawings, specialized reference books or other writers in their departments. If the material they need is undocumented, they have to go to the experts in the field. As I have already mentioned, difficulty with vocabulary is not restricted to non-technical people. One general practicioner in medicine said that he had difficulty understanding the vocabulary of other specialists in medicine.

In building respect from experts writers endeavor to learn as much about a technical area as possible, reading manuals and books. Writers with non-technical backgrounds seem torn between trying to conceal their lack of knowledge and asking questions to gain a clearer understanding. One writer told of a problem which he often encounters in dealing with engineers, "They [engineers] think that you understand their explanations immediately." I suspect that part of the reason for engineers believing that non-technical persons understand immediately occurs because lay persons do not reveal that they do not understand, fearing that they will lose respect. Another reason for non-technical writers neglecting to get all the information needed is that they have not identified what they need to know. Often they have a vague feeling of uncertainty about the material, so they arrange consultations with engineers without clearly organizing the questions which they need to ask.

One interview session which I attended between a writer with a non-technical background and an engineer illustrated that the writer thought he needed to ask one question, but in fact he needed the answer to another one also. He began the interview by asking about the sequence involved in installing two pipes. The engineer gave him the specifications on the two pipes: one 5" in diameter; the other 9". One pipe was to be installed inside the other. The writer had not realized that the main problem was his not knowing the dimensions. Once he knew the dimensions, the sequencing was clear.

The writers interviewed who often consult experts find that they have difficulty controlling the interview. The writers would start with a specific question. This question would be answered by the expert, but then he or she would often begin to elaborate upon the equipment while the writer simply took notes. After the interview the writer would try to decipher his or her notes and determine if they contained what was needed. This type of interviewing often leads to the need for further interviews to obtain all the necessary information. If the writer controlled the interview, time could be spent more efficiently.

Figure 1 Elements of Understanding Technical Material



In talking with writers with non-technical backgrounds, I found that most of the questions which they want experts to answer fall into a few categories: terminology, application, procedures, and principles. I have devised a model (Figure 1) which consists of the elements needed for understanding technical material, especially that material which consists of procedures or product descriptions. Along with the types of input (such as terminology) I have written questions which pertain to these specific types. The types of input are arranged in a sequence beginning with terminology and ending with principles. If the writers use this model as a basis for interviews with experts, asking questions about any categories which writers realize that they do not understand, they might have better results. Such a model would help writers to identify areas in which they need clarification. This model provides a systematic approach to information gathering.

In learning terminology, the writer may become familiar with either an abstract representation (drawings, verbal definitions) or a concrete one (actual equipment). The terminology portion may be the one which writers can most readily learn without having to consult someone else. Whether writers have to rely on written material or consultations, they must ask the question "What is it?" before they can proceed to further understanding of the material. In discussing terminology with experts they may have to ask for comparisons with known objects or known procedures or they may have to ask experts to make crude drawings so that the objects can be visualized.

In writing about equipment, writers should take any available opportunity to actually view the equipment. One writer told me that he had attended maintenance seminars to view the equipment and learn applications. Another said that he visited the stockroom to look at parts. Viewing the equipment makes the concept of form more realistic in terms of contours and dimensions.

The next step after understanding form is understanding function. This step consists of two parts: application and procedures. Application is learned when the writer pursues the question: "What does this do?" To understand procedures the writer must ask questions relating to "how." He or she must ask for steps involved and sequence.

To completely understand an object or process, the writer should understand the principles involved. One writer told me that if he could understand the laws of physics involved he could more readily understand the process. Most non-technical persons interviewed are not concerned with this level of knowledge. But if writers understand the underlying principles, "the why's" of application and procedures, they would have an overview of their subjects which would allow them to see the logic involved.

If the writer uses this model he or she should be more able to define the areas in which he or she needs further knowledge. Using such a model as an interview schedule should provide more control of the interview and a checklist of the understanding needed.

The last area which I looked at in my survey had to do with the primary concern of writers after they had gathered their information. Table 3 illustrates the concern which writers thought of most often in the pre-writing phase.

Table 3 Primary Pre-writing Concerns of Personnel Interviewed

Type of degree	Purpose	Audience	Organization
Technical	6	0	0
Non-technical	1	7	1

Technical personnel were not only more concerned with purpose than were non-technical personnel, they also mentioned that establishing purpose was often a problem for them. They had difficulty in focusing their content. Technical personnel may have difficulty with purpose because, to a large extent, they do not consider audience; purpose is a natural outgrowth of the needs of the audience. The technical personnel interviewed write only for technical audiences and they write informational material. They assume that the audience has the same expertise that they have. Three non-technical personnel who write informational material are concerned with audience. They are concerned with the informational needs of the audience, with anticipating questions and with simplifying material.

Of the writers whom I interviewed only those with non-technical backgrounds write motivational materials. Writing motivational materials requires a concern with audience. Only one writer of motivational materials is concerned with purpose; all the others are concerned with audience. The one concerned with purpose has few ways of knowing her audiences directly; she is a free-lance writer of promotional materials for various clients. The other writers of motivational materials write with an audience response clearly in mind. They are trying to sell a product or gain consent and build enthusiasm for a project. They are concerned with persuasive tactics, so they are aware of their audiences' needs, prejudices and levels of expertise. Awareness of the audiences' needs provides a guide to purpose and focus. These writers, all non-technical, realizing the needs of their audiences, understand that their rhetorical tasks are either to recommend or request or explain, etc. Concern with audience seems to lead to fewer difficulties with establishing purpose and focusing written material.

I have tried to provide a summary of the primary pre-writing concerns of fifteen technical writers. Although this sample is too small to be conclusive, it does show some trends. I have compared the pre-writing concerns of writers with technical and non-technical backgrounds. I have reached the conclusion that ability to relate to audience is of primary importance and that non-technical personnel are more aware of this consideration than are technical personnel. Those writers who interview experts as part of their jobs find that these experts have difficulty relating to writers' needs and levels of expertise. By using a model of elements involved in understanding technical material, writers can probably control their informational needs more adequately. Using this model to control the interview with technical experts, the writer can make these experts more aware of his or her needs as a writer. Conversely, if the writer focuses on the audiences' needs, he or she has little trouble in establishing purpose in writing.